1. SCOPE

2. CONNECTIONS

- 2.1 Input connector
- 2.2 Output connector
- 2.3 Pin assignments

3. ELECTRICAL REQUIREMENTS

3.1 Input

- 3.1.1 Input voltage
- 3.1.2 Input current
- 3.1.3 Input frequency
- 3.1.4 Inrush current
- 3.1.5 Efficiency
- 3.1.6 Power Factor.

3.2 Output

- 3.2.1 Output power
- 3.2.2 Output voltage
- 3.2.3 Output current
- 3.2.4 Output regulation
- 3.2.5 Output ripple and noise voltage
- 3.2.6 Output transient response
- 3.2.7 Output voltage drift
- 3.2.8 Output overshoot
- 3.2.9 Output protection
- 3.2.10 Rise time
- 3.2.11 Turn-on delay
- 3.2.12 Output hold-up time
- 3.2.13 Remote sense
- 3.2.14 Power fail
- 3.2.15 Power good
- 3.2.16 Temperature coefficient

4. ENVIRONMENTAL REQUIREMENTS

- 4.1 Temperature
- 4.2 Altitude
- 4.3 Humidity
- 4.4 Shock and Vibration
- 4.5 Input transient susceptibility
- 4.6 Input harmonic compliance

5. SAFETY REQUIREMENTS

- 5.1 Dielectric withstand voltage
- 5.2 Insulation resistance
- 5.3 Leakage current
- 5.4 Safety spacing
- 5.5 Safety standards

6. RELIABILITY

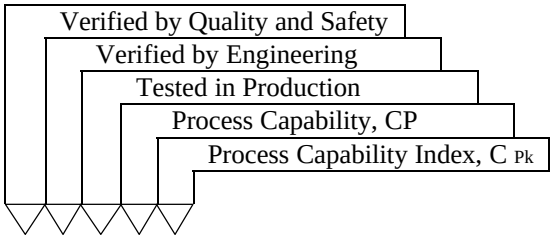
6.1 MTBF 6.2 FIT

7. EMI REQUIREMENTS

8. APPLICABLE DOCUMENTS

9. MECHANICAL

- 9.1 Weight
  - 9.1.1 Complete Unit
- 9.2 Dimensions



1. SCOPE

The purpose of this document is to specify the functional requirements of a convection cooled 80Watt continuous output and 130Watt with forced air PSU with dual AC input (110/220 VAC with auto select). The PSU contains four DC outputs in an open frame, PCB mount design, with harmonic correction and dual closed loop control. Both V1 & V2 have remote sense and single wire current share.
Models covered : VLT130-4110, VLT130-4111, VLT130-4112

2. CONNECTIONS

The following will specify the input and output connections provided by the power supply.

2.1 INPUT CONNECTOR
Molex P/N 26-60-4030 (Center pin removed) Mating connector: Molex 09-50-3031

2.2 OUTPUT CONNECTORS
Power connector: Thomas & Betts P/N 2MV-06 Mating connector: wire input, (maximum tightening torque=5 inch lbs.).
PF connector: Molex P/N 22-23-2081 Mating connector: Molex P/N 10-11-2083

2.3 OUTPUT PIN ASSIGNMENTS INCLUDING SENSE and POWER FAIL.

P/N : 2MV-06							
	VLT130-4110	**Pin-outs**	**VLT130-4111**	**Pin-outs**	**VLT130-4112**	**Pin-outs**	
V1	+5V	Pin-5	+5V	Pin-5	+5V	Pin-5	
	COM	Pin-3,4	COM	Pin-3,4	COM	Pin-3,4	
V2	+3.3V	Pin-2	+3.3V	Pin-2	+3.3V	Pin-2	
V3	+12V	Pin-1	+24V	Pin-1	+15V	Pin-1	
V4	-12V	Pin-6	-12V	Pin-6	-15V	Pin-6	
P/N : 22-23-2081							
	5Vsns+	Pin-6	5Vsns +	Pin-6	5Vsns +	Pin-6	
	5Vsns -	Pin-5	5Vsns -	Pin-5	5Vsns -	Pin-5	
	3.3Vsns +	Pin-7	3.3Vsns +	Pin-7	3v3sns +	Pin-7	
	3.3Vsns -	Pin-8	3.3Vsns -	Pin-8	3.3Vsns -	Pin-8	
	N/C	Pin-2	N/C	Pin-2	N/C	Pin-2	
	N/C	Pin-1	N/C	Pin-1	N/C	Pin-1	
	P fail	Pin-3	P Fail	Pin-3	P Fail	Pin-3	
	COM	Pin-4	COM	Pin-4	COM	Pin-4	

3. ELECTRICAL REQUIREMENTS

(Unless specified otherwise, all specifications are at nominal input voltage, full load, 25°C, with PSU in warmed up condition. Unless specified all spec. will be within 3% of the stated typical value.)

This section defines the electrical requirements for the power supply unit.

						3.1	INPUT The operating conditions for the AC input are described in this section.
	X					3.1.1	INPUT VOLTAGE The operating range is 90-132 VAC/180-264 VAC, single phase. Nominal V_n = 115/230.
						3.1.2	INPUT CURRENT With an input voltage of 90VAC, at 130W output, the RMS input current shall be less than 3.3A.
	X					3.1.3	INPUT FREQUENCY Input frequency range 47 – 63 Hz.

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						3.1.4	INRUSH CURRENT Maximum inrush shall be 40A at 240VAC at cold start.
	X					3.1.5	EFFICIENCY The efficiency of the power supply is >81% typical. Measured at 5.1V @ 10A, 3.3V @ 10A, and +12V@1.0A/+24V@0.5A/+15V@0.8A with 230 VAC input. Measurement is taken at the PCB connector pads at 25°C ambient after a 5 minute warm up cycle.
	X					3.1.6	POWER FACTOR The minimum PF at Full load, at 230VAC is > 0.95
						3.2	OUTPUT The operating conditions for the DC output are described in this section.
						3.2.1	OUTPUT POWER The power supply will provide up to four regulated DC outputs. The MAX total continuous output power is 80W with free air convection and 130 watts with 15CFM of forced airflow over the unit. See mechanical diagram for airflow requirements.
	X					3.2.2	OUTPUT VOLTAGE Initial setting tolerance is measured with 50% of load range for free air convection on all outputs, with line voltage set at nominal. The voltage and initial setting tolerance of each output will be provided as follows. V1 & V2 adjustable to +300mv/-200mV. Measured at connector without sense lines.

Model	O/P							
	NOM. V1	SET TOL.	NOM. V2	SET TOL.	NOM. V3	SET TOL.	NOM. V4	SET TOL.
VLT130-4110	+5.1V	± 1 %	+3.3V	± 1 %	+12.5V	± 5 %	-12.3V	± 5 %
VLT130-4111	+5.1V	± 1 %	+3.3V	± 1 %	+24.0V	± 5 %	-12.0V	± 5 %
VLT130-4112	+5.1V	± 1 %	+3.3V	± 1 %	+16.3	± 5 %	-16.3	± 5 %

						3.2.3	OUTPUT CURRENT Maximum load capacitance will be less than 3000uF for V1and V2. It will be less than 330uF for V3, V4.
						3.2.3.1	RATED OUTPUT CURRENT Max continuous current rating of the individual outputs is listed in the following table. The peak/surge current rating for 100msec/10Sec duty cycle is indicated in parenthesis ( ). For V1/V2, Max current/ Surge current rating is shown. At 15CFM-air flow, the surge current becomes the continuous rated current, providing 130W total output power.

Model	V1*		V2*		V3		V4	
	Min.	Max. Free air /Fan	Min.	Max . Free air /Fan	Min.	Max	Min	Max
VLT130-4110	1.0A	10A/14A	1.0A	10A/16A	0.1A	1.5A	0.1A	1.5A
VLT130-4111	1.0A	10A/14A	1.0A	10A/16A	0.1A	1.5A	0.1A	1.5A
VLT130-4112	1.0A	10A/14A	1.0A	10A/16A	0.1A	1.5A	0.1A	1.5A

* Max total power on the combination of either the V1and V4 or the V2 and V3 should be less than 55 watt free air and 75 watts forced air.

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	X						3.2.3.2	LOAD SHARING/ PARALLEL OPERATION: The 4110 series does not have current share options
						3.2.4		OUTPUT REGULATION
	X						3.2.4.1	LINE REGULATION Measured by varying the line voltage from 90 - 132VAC/180 - 264VAC, at full load.

OUTPUT	**V1**	**V2**	**V3**	**V4**
TOLERANCE	0.3%	0.3%	0.3%	0.3%

							3.2.4.2	LOAD REGULATION Measured by varying the load current from NOM to MAX and from NOM to MIN load at nominal AC input voltage with all other outputs set to 20% of full load. This is measured at the output connector after 500 ms settling time, and expressed as percentage of set point voltage. The Max value (worst case) is shown below.

	Load Regulation of Outputs			
Model	**V1**	**V2**	**V3**	**V4**
VLT130-4110	± 1 %	± 1 %	± 5 %	± 5 %
VLT130-4111	± 1 %	± 1 %	± 5 %	± 5 %
VLT130-4112	± 1 %	± 1 %	± 5 %	± 5 %

							3.2.4.3	CROSS REGULATION Keeping the output under observation at 50% load, while varying all other output loads by 50% of their respective load range, the said output will meet the load regulation limit of section 3.2.4.2. The total output power should never exceed the rated max power. Voltage is measured at the output connector after a 500ms settling time. A typical characteristic of the VLT130 series is shown below.

Typical Cross Loading							
Load.(Amp)				Output			
V1	**V2**	**V3**	**V4**	**V1**	**V2**	**V3**	**V4**

	X						3.2.5	OUTPUT RIPPLE AND NOISE VOLTAGE (PARD) The maximum allowable pk-pk PARD ripple and noise, measured at max load on the specific output while keeping total max o/p power to 100W/130W is shown in the following table. It is measured after a 5 minute warm up with 0.1 C-Cap and 10uf E-Cap/Tant Cap connected at the measurement point. Line voltage is set to MIN 90V and 185V for the test.

Model	**Ripple Pk-Pk (PARD)**			
	V1	**V2**	**V3**	**V4**
VLT130-4110	50 mV	50 mV	150 mV	150 mV
VLT130-4111	50 mV	50 mV	240 mV	150 mV
VLT130-4112	50 mV	50 mV	150 mV	150 mV

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	X					3.2.6	OUTPUT TRANSIENT RESPONSE The load current of measured output is changed from 50% of load range to 100%, at 0.1A/uSec slew rate, 50% duty cycle, 50/60Hz. The recovery time is measured with reference to the point when the output voltage is within 1% of the load regulation band. The maximum excursion is measured with reference to the point of stability. These are measured after a 5-minute warm up with 0.1 C-Cap and 47uf E-Cap connected at the measurement point to reflect an actual load setup. All other outputs are kept at 50% load. Line voltage is set to NOM 115V and 230V for the test.

OUTPUT	V1	V2	V3	V4
RECOVERY TIME	<1 ms	<1 ms	<1 ms	<1 ms
MAXIMUM EXCURSION	<7%	<7%	<3%	<3%

						3.2.7	OUTPUT VOLTAGE DRIFT Long-term output voltage drift over 1000 hours operation for V1 & V2 is less than 0.5%.
	X					3.2.8	OUTPUT OVERSHOOT The overshoot voltage is measured as a percentage of the nominal output voltage when PSU is initially powered up. Measured with V1 @ 10A,V2 @ 10A (resistive load) with ref. to their respective load regulation band. Line voltage is set to NOM 115V and 230V for the test.

OUTPUT	V1 & V2
OVERSHOOT	<5%

						3.2.9	OUTPUT PROTECTION The power supply is provided with protection against any fault condition described below and will self-recover with a maximum restart time of 6 seconds after the fault condition has been removed.
						3.2.9.1	OVERVOLTAGE Output shutdowns at; V1=6.2V± 0.4 V or V2 =4.5V ± 0.4V to protect the load.
						3.2.9.2	OVERLOAD PROTECTION Typically occurs between 160-230W. O/P shuts down and hiccups. The PSU will recover when overload condition is removed
	X					3.2.9.3	OUTPUT SHORT CIRCUIT The power supply is protected against output short circuit. RMS short circuit shall be less than 0.5 A RMS under all conditions. Output voltage of less than 0.5V constitutes a short.
	X					3.2.10	RISE TIME The output rise time measured from 10% to 90% is :

OUTPUT	V1	V2	V3	V4
RISE TIME	<10 ms	<10 ms	<10 ms	<10 ms

	X					3.2.11	TURN-ON DELAY The turn-on delay time of the main output after AC power is applied from a cold condition is 4.0 seconds MAX at 115 VAC.
	X					3.2.12	OUTPUT HOLD-UP TIME The power supply shall maintain all outputs with their voltage/current specifications after any loss of input power for a minimum of 13 milliseconds, measured at nominal AC input voltage (115VAC). Measured at V1 regulation band crossing.

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						3.2.13	REMOTE SENSE Max. of 400mV compensation for o/p cable drop, at V1 and V2 outputs by direct remote sensing at load end. See sec. 2.3 for remote sense availability. Use of Remote Sense requires 15LFM of airflow.
						3.2.14	POWER FAIL 2ms (min) warning before 5V output drops to 4.7VDC after loss of AC input at all line conditions.
						3.2.15	POWER GOOD 30ms typical after the 5V output reaches regulation voltage at nominal line conditions.
						3.2.16	TEMPERATURE COEFFICIENT Measured on V1 and V2 only, temperature coefficient over entire operating temperature range of 0ºC to 50ºC after one-hour warm-up is:

OUTPUT	**V1 & V2**
COEFFICIENT	<2.4mV/°C

4. ENVIRONMENTAL REQUIREMENTS

						4.1	TEMPERATURE Operating temperature range: 0ºC to 50ºC at the full rated output power. Non-operating temperature range: -40ºC to +85ºC.
						4.2	ALTITUDE Maximum operating altitude: 10,000 feet. Maximum Non-operating altitude: 40,000 feet.
						4.3	HUMIDITY Non-condensing relative humidity range: 5% to 95%.
						4.4	SHOCK AND VIBRATION Operating Shock: Three shocks, 15G peak, 11mS sinusoidal, ±1 mS. Both directions of perpendicular axis. Non-Operating Shock: Three shocks, 50G peak, 11mS sinusoidal, ±1 mS. Both directions of perpendicular axis. Operating and Non-Operating Vibration: 5-9Hz, 0.5" double amplitude, 2G PK, 0.5 oct./min, 2 cycles; 9-500Hz, 4G pk-pk, 0.5 oct./min, 2 cycles.
X	X					4.5	EMI TRANSIENT SUSCEPTIBILITY The unit shall comply to the requirements of IEC 1000-4-2, 1000-4-4 and IEC 1000-4-5.
X	X					4.6	INPUT HARMONIC COMPLIANCE The unit shall comply with IEC 1000-3-2

5. SAFETY REQUIREMENTS

						5.1	DIELECTRIC WITHSTAND VOLTAGE Minimum dielectric withstand voltage between input to output = 4250VDC / 1 minute.
						5.2	INSULATION RESISTANCE Minimum insulation resistance: Input to output - 7M ohm.
	X					5.3	LEAKAGE CURRENT Leakage current per IEC 950 shall be 1000uA maximum.
	X					5.4	SAFETY SPACINGS The PCB spacing will comply with the Safety Standards per 5.5.
	X					5.5	SAFETY STANDARDS The power supply will meet Class 1, SELV of the following safety agency requirements: IEC 950, EN60950, with the following deviations: VDE. UL 1950 (Recognized Component) C-UL (Canadian Approval by UL)

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6. RELIABILITY

6.1	MTBF (Mean time between failure): MTBF @ 25ºC is more than 150,000 hours. Calculated as per BELLCORE T12-332.
6.2	FIT (Failure in time): Combined FIT of all critical component @ 25ºC, full load is less than…..

7. EMI REQUIREMENTS

The power supply shall comply to the limits CISPR 55022 and CISPR 55014, Level B (at 230 VAC and 115 VAC). FCC 47 CFR Part 15, Level B (115 VAC)

8. APPLICABLE TEST DOCUMENTS

Audit Test Program
Production 1 Test Program
Production 2 Test Program
QC Test Program

9. MECHANICAL

9.1 WEIGHT

9.1.1 Complete PSU : Total weight = 10.5 oz.

9.2 DIMENSIONS

9.2.1 Outline Dimension: External dimensions of the PSU, including any case, heatsink or cord is shown below.